

Claims

[c1] What I claim as my invention is:

1. A smart switch called Occupant Counter Controlt Switch, or OCCS, automatically turning on and off electrical appliances by intelligently keeping track of and displaying the number of occupants in a room via the process of counting up or counting down when detecting a person entering or leaving the room respectively (see Fig. 1), the said OCCS comprises of:

a Vision–Restricted PIR Motion Detector for generating two distinctive signals that correspond to the two different directions of a person entering or exiting the room (see Fig. 5 and Fig. 4);

a removable dome shape clear plastic or Fresnel lens for covering and protecting the said Vision–Restricted PIR Motion Detector from accidentally getting contacted and changed its pre-aimed direction (see Fig. 2);

a photo sensor for detecting ambient light (see Fig. 3 or Fig. 6);

a digital display controlled by the embedded program that sequentially and rapidly flashes each segment at a time for displaying the figure of the count

value that indicating number of occupants in the room, or displaying the scale value of tuning processes, or displaying a letter "L" indicating the system is in sleep mode, or a letter "A" indicating the system is in adjusting mode (see Fig. 2); two soft touch push buttons for manually controlling the relay, driving the electrical load, and for serving other functions (see Fig. 2); an amplifier circuit with band-pass filter for filtering 60 to 120 Hz noises and amplifying the signal of the said PIR sensor (see Fig. 6); a delicate and complicated program embedded in a microprocessor IC chip as a central processing of all inputs and outputs of the said smart switch.

[c2] 2. The OCCS or smart switch as claimed in claim 1, wherein said the Vision-Restricted PIR Motion Detector is further comprises of:

- a cylinder tube encapsulates a dual-element PIR sensor to form a vision-restricted sensor for narrowing the detection angle of the said PIR sensor (see Fig. 5A);
- a pivot-join supporter allows the said Vision-Restricted PIR Motion Detector to be adjusted to point at any direction (see Fig. 8) so that the OCCS can be mounted at the right side or left side of the entrance

of the room or can be aimed down to detect children.

[c3] 3. The OCCS or smart switch as claimed in claim 1, wherein said the two push buttons controlled by the said embedded program make up nine combinational function keys: an adjusting count up key when the Up/Down Counter button is pressed and held in longer than half of a second, an adjusting count down key when the Up/Down Counter button is pressed and held in shorter than half of a second, a manually toggling on key to close the said relay to turn on the lights when the OnOff/Sleep button is pressed and held in less than half of a second while the lights have been off, a manually toggling off key to open the said relay to turn off the lights when the OnOff/Sleep button is pressed and held in less than half of a second while the lights have been on, an activating sleep mode key when the OnOff/Sleep button is pressed and held in longer than half of a second, when the two buttons are pressed and then released together the first time allowing accessing to other four remaining function keys, typically the key to increase the noise immunity of the said PIR signal when the Up/Down Counter button is pressed and held in more than half of a second, the key to decrease the noise immunity of the said PIR signal when the Up/Down Counter button is pressed and held in less than half of a second, the key to raise the light

demanding level when the OnOff/Sleep button is pressed and held in longer than half of a second, the key to lower the light demanding level when the OnOff/Sleep button is pressed and held in shorter than half of a second, finally the two buttons are pressed and released together the second time, or no further pressing on any button for one minute, the adjusting mode is terminated and the system resumes its normal operation.

- [c4] 4. The OCCS or smart switch as claimed in claim 1, wherein said the micro-processor is an IC chip that comprises of an output tied to a relay or a triac to drive electrical appliances, other seven outputs to drive seven LED segments of the said digital display, two analog to digital converter inputs to digitize the amplified signal of the said PIR sensor for counting process and to digitize the signal of the ambient light from the said photo sensor for co-controlling the said relay, and the other two inputs tied to the said two push buttons (see Fig. 3 or Fig. 6).
- [c5] 5. The OCCS or smart switch as claimed in claim 1, wherein said the embedded program dwells in the said microprocessor as a central processing unit is based on the control algorithm (see Fig. 7) that will be clarified in the Detailed Description.